

# ROCKWELL LIME COMPANY

4110 Rockwood Rd , Manitowoc, WI 54220-9619 • 920-682-7771 • 1-800-558-7711 • Fax: 920-682-7972

March 31, 2004

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

**RECEIVED**

APR 08 2004

AIR ENFORCEMENT BRANCH,  
U.S. EPA, REGION 5

Stephen Rothblatt, Director  
AE-17J  
Air and Radiation Division  
United States Environmental Protection Agency  
Region 5  
77 West Jackson Boulevard  
Chicago, IL 60604-3590

Re. Rockwell Lime Company  
Manitowoc, Wisconsin

Dear Director Rothblatt

We received your letter of February 24, 2004, which provides USEPA's response to the discussion that took place at the meeting held on January 14, 2004 between representatives of USEPA and Rockwell Lime Company (RLC). In addition, our outside counsel appreciates the opportunity she had to speak with Attorney Louise Gross of the USEPA Office of Regional Counsel about the February 24 letter and our January 14 meeting

A. **Background Information:**

Before we address the two issues identified in USEPA's February 24 letter, we believe the following background information will be helpful to this discussion

1 **Description of RLC's sampling and testing protocols**

USEPA's February 24 letter evidences confusion on USEPA's part about how and where RLC takes it fuel samples Footnote 1 on page 1 of USEPA's February 24 letter states as follows:

"The sulfur content is determined using an ASTM method, the sample is taken past the coal mill, but prior to the lime kiln combustion chamber. The moisture content is determined by using an procedure equivalent to an ASTM method. *The sample is taken at the stockpile, prior to any grinding or uniformity of the fuel*, and dried to determine the weight difference or, in this case, the percent moisture in the sample" (emphasis added)

The statement that the “sample is taken at the stockpile, prior to any grinding or uniformity of the fuel” is incorrect and USEPA’s understanding of how and where RLC takes its samples is incomplete. We hope the following description will provide clarification

**Attachment 1** is a schematic which shows the following taking place at the marked points.

**Point A** is the point between the roll crusher and the bucket elevator where the wet solid fuel is sampled to be analyzed for moisture content. The wet solid fuel is delivered to the facility by truck and dumped into the truck dump hopper. The belt conveyor conveys the wet solid fuel from the truck dump hopper to the roll crusher; from the roll crusher the wet solid fuel goes to the bucket elevator. The wet solid fuel sample taken at Point A is taken to the RLC lab for analysis of the *moisture content*.

From Point A, the wet solid fuel goes through the bucket elevator, onto the belt conveyor, and into the solid fuel bin, from the solid fuel bin, the wet solid fuel goes to the gravimetric weigh feeder, which we’ve labeled Point B.

**Point B** is the gravimetric weigh feeder where the wet solid fuel is weighed. After the wet solid fuel is weighed it goes, still as wet solid fuel, into the coal mill.

From Point B, the wet solid fuel goes through the coal mill. In the coal mill the wet solid fuel is pulverized. Hot air is drawn off the kiln firing hood and tempered with ambient air to automatically maintain, through a temperature controller, the outlet temperature from the coal mill. The coal mill primary air fan provides the suction to draw this hot air through the coal mill; it also classifies the fineness of the solid fuel in the classifier built into the coal mill. The fan then blows the pulverized solid fuel and the vaporized moisture from the coal mill into the burner pipe and then into the kiln. Before the fuel enters the kiln, an automatic sampling system extracts a sample of the pulverized solid fuel every 5 minutes to create a uniform composite sample. This automatic sampling system is located in the burner pipe at the solid fuel sulfur sample point which we’ve labeled Point C.

**Point C** is the solid fuel sulfur sample point. Point C is a point in the burner pipe, before the kiln, *where the automatic sampling system takes a sample of the pulverized solid fuel*. The sample is taken to the RLC lab for analysis of the *sulfur content* of the pulverized solid fuel.

From Point C, the pulverized solid fuel and the vaporized moisture go through the remainder of the burner pipe and into the kiln. Natural gas is added to the solid fuel and vaporized moisture just before the kiln and the resulting fuel blend enters the kiln for combustion.

RLC’s solid fuel firing system is a direct fired closed system. In other words, what is weighed and goes into the coal mill goes through the burner pipe and into the kiln. RLC’s solid fuel arrives at the facility as “wet” solid fuel (i.e., with moisture in it). In the industry, this is referred

to as “as received”<sup>1</sup>. The “as received” solid fuel is “wet” and is weighed as wet solid fuel. The amount of sulfur which is calculated to be in the wet solid fuel when it is weighed is the same amount of sulfur that goes into the coal mill, through the burner pipe and into the kiln. The amount of sulfur in pounds per hour in the wet solid fuel is calculated using the following equation.

$$\text{Pounds of sulfur/hour} = \frac{\text{wet solid fuel weight per day} \times \frac{\text{wet sulfur \%}}{100}}{24 \text{ hours/day}}$$

**Attachments 2 and 3** are two examples of solid fuel analysis reports. One was prepared by SGS, a testing and engineering laboratory (February 9, 2004); the other by Freeman United Coal Mining Company (April 21, 1978). These reports show that the standard in the industry is and has been for at least 26 years to report solid fuel constituents on the basis of both “as received” and “dry” % content.

The following chart excerpts information from the SGS and Freeman Coal laboratory analyses. Whether the results are reported as “as received” (i.e., “wet”) or “dry”, the total of the constituents must add up to 100%. For example, using the SGS analysis, to use the “dry %” for sulfur when everything else is based on the “as received %” would mean replacing the **2.13%** sulfur with **2.39%** sulfur, thus giving a total of 100.26% as opposed to 100%. (See the discussion under Section B.1.b., paragraph 2, on this point.)

Ultimate Analysis	SGS		Freeman Coal	
	As Recd	Dry	As Recd	Dry
% Moisture	10.99		11.00	
% Carbon	69.50	78.08	64.73	72.73
% Hydrogen	3.99	4.48	4.39	4.93
% Nitrogen	1.25	1.40	1.33	1.50
% Chlorine	0	0	0.30	0.34
% Sulfur	<b>2.13</b>	<b>2.39</b>	1.85	2.08
% Ash	7.65	8.59	8.28	9.30
% Oxygen	4.49	5.06	8.12	9.12
Total %	100.00	100.00	100.00	100.00

<sup>1</sup> The solid fuel comes out of the ground “wet” and is delivered “wet” for safety reasons, among others. Dry coal and coal dust, for example, pose a significant risk of explosion in an enclosed bin. The following point may also help clarify some confusion. If a company specifies to its vendor that it wants to purchase a solid fuel with a specified % sulfur content – for example, 2.1% sulfur coal -- the vendor will deliver a solid fuel meeting that specification based on the “as received” % sulfur content measurement.

2. *The term “solid fuel” is not synonymous with the term “fuel blend”*

USEPA’s February 24 letter also evidences some confusion in the use of the terms “solid fuel” and “fuel blend”.

The “solid fuel” portion of the “fuel blend” may be any proportion of coal, coal/petroleum coke, or petroleum coke (with attendant moisture); the “fuel blend” refers to the solid fuel (and moisture) and natural gas, in varying proportions. It is important to note that both RLC’s 1995 Permit and RLC’s 2003 Permit use the 2.1% sulfur content limit as a restriction placed on the “fuel blend” not the “solid fuel” portion of the fuel blend. USEPA’s January 13, 1995 letter correctly referred to the 2.1% sulfur content limit as a limit on the sulfur content of the “fuel blend”. However, USEPA’s recent correspondence appears to treat “solid fuel” and “fuel blend” as though they are the same thing. They are not, and this may account for some of the confusion that has arisen in this situation.

B. **RLC’s Response to USEPA’s two issues**

USEPA’s February 24 letter identifies two issues. We address each in turn.

1. *Compliance with the 147 pound per hour sulfur input limit:*

At our meeting on January 14, 2004, RLC presented information which demonstrates we have consistently complied with the 147 pound per hour limit on sulfur input in the fuel we burn in Kiln #2. That information was contained in Attachment C to the January 13, 2004 letter RLC hand-delivered at the January 14 meeting. Our January 13 letter also shows that RLC has consistently utilized the compliance demonstration equation established in RLC’s 1995 and 2003 Permits to calculate compliance with the 147 pound per hour limit on sulfur input.

The February 24 letter states that USEPA believes our method of calculation is incorrect and that the following method should be used:

*“In this case, ‘as fired’ would best be represented by the weight of coal/petcoke as measured by the facility, times the ‘as fired’ sulfur content determined prior to combustion of the fuel. . . .” (emphasis added)*

We disagree for the following two reasons:

a. *First, USEPA’s conclusion appears to be based in part on a misunderstanding of our procedures.*

USEPA’s February 24 letter *incorrectly* describes our process as follows:

*“According to the company, it has been calculating this number assuming that all moisture evaporates from the coal/petroleum coke (petcoke) prior to its combustion. It*

performs this calculation by subtracting the percent moisture from the sulfur weight percent ”

A more complete explanation of our procedures is provided in Section A Background Information. However, an accurate (but abbreviated) explanation of what we do is as follows

“According to the company, it has been calculating this number recognizing that the moisture separates from the solid fuel as water vapor when the solid fuel is pulverized in the coal mill, but the vaporized moisture remains in the fuel stream with the solid fuel as it enters the kiln for combustion<sup>2</sup>. Thus, the solid fuel, vaporized moisture, and natural gas comprise the fuel blend which is combusted. RLC calculates the wet % sulfur content of the solid fuel by using the following formula.

$$\% \text{ sulfur wet} = (1 - \frac{\% \text{ moisture}}{100}) * (\% \text{ sulfur dry})”$$

**The significance of these points is that the solid fuel is weighed with the moisture in it, and the solid fuel is burned in combination with the moisture.** Thus, RLC has correctly performed the equation as shown in Attachment C to our January 13 letter by using these two factors in the equation in their “wet” form

b. *Second, USEPA’s conclusion mixes “apples” and “oranges” by using a “wet” factor in one part of the equation and a “dry” factor in another part of the equation.*

As explained, RLC and all other users of coal and petroleum coke in the industry, use the term “as received” to describe the components of the solid fuel as the solid fuel is received at the facility from the vendor. The solid fuel contains moisture in its “as received” condition, so we refer to it here as “wet solid fuel”

It is not clear to us from the February 24 letter what USEPA means by “the ‘as fired’ sulfur content determined prior to combustion of the fuel”. We believe USEPA intends that phrase to mean that the “as fired” sulfur content of the solid fuel portion of the fuel blend should be treated as though it does not contain moisture – i.e., that it is “dry”. If this is what USEPA means, then USEPA is mixing “apples” and “oranges”.

USEPA’s approach would use a “wet” factor in one part of the equation – because the “weight of coal/petcoke as measured by the facility” will provide a “wet weight”. But, it would use a “dry” factor in the other part of the equation, if the “‘as fired’ sulfur content determined prior to combustion of the fuel” is meant to provide a “dry % sulfur content”. That approach would incorrectly mix “wet weight” and “dry % sulfur content” in the equation. The SGS and Freeman Coal charts provided in Section A. Background Information illustrate the problem with

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<sup>2</sup> Whether all of the moisture in the solid fuel is vaporized in the coal mill has no bearing on the sulfur input to the kiln. The “% sulfur dry” along with the moisture at the gravimetric feeder (Point B on Attachment 1) determine the “% sulfur wet”. The weight of the “wet solid fuel” recorded at the gravimetric feeder multiplied by the “% sulfur wet” determines the sulfur input to the kiln.

that approach. That approach is mathematically incorrect because to have an accurate and representative calculation, both of these factors or inputs to the equation must be on the same basis, i.e., either both “wet” or both “dry”. Because RLC weighs the solid fuel “wet”, we have consistently performed the calculation using “wet weight” and “wet % sulfur”.

As noted earlier, the compliance data RLC presented in Attachment C to our January 13, 2004 letter was based on performing the equation using “wet weight” and “wet % sulfur content” (“wet/wet”). Those data show consistent compliance with the 147 pound per hour sulfur input limit in the fuel blend. In response to the February 24 letter, we have prepared an additional spreadsheet which is based on performing the equation using “dry weight” and “dry % sulfur content” (“dry/dry”). **Attachment 4** Rather than perform this calculation for each day over the entire period of January 1997 through November 2003, we selected the month of June 2003 as a typical month. As **Attachment 4** demonstrates, when the equation is performed on the “dry/dry” basis, the results are identical to those obtained when it is performed on a “wet/wet” basis: **RLC has consistently complied with the 147 pound per hour limit on sulfur input in the fuel blend.**

2. Compliance with the 2.1% sulfur content in the fuel blend.

USEPA’s February 24 letter takes the position that RLC’s Permits contain two independently enforceable definitions of Best Available Control Technology (BACT): a 2.1% sulfur content limit on the fuel blend; and a 147 pound per hour sulfur input limit on the fuel blend. USEPA points to the September 1979 Permit and the January 13, 1995 letter from USEPA to the Wisconsin Department of Natural Resources (WDNR) as support for its position.

We disagree, based on the language of five documents: 1) RLC’s 1995 Permit (February 7, 1995), 2) RLC’s 2003 Permit (June 30, 2003), 3) WDNR’s December 20, 1994 letter to USEPA, 4) USEPA’s January 13, 1995 reply to WDNR, and 5) USEPA’s November 25, 2003 Notice of Violation.

In 1994 RLC, along with many other lime companies, recognized the need to burn approved alternative solid fuels (in addition to coal) while still meeting the sulfur input limitation to the kiln. Through many meetings with WDNR, the equation in our 1995 and 2003 Permits which limits the sulfur input to the kiln to 147 pounds per hour averaged over 24 hours evolved as the means to accomplish this goal. We note that USEPA concurred in both of those permits, and has not objected to this method of compliance in the intervening 8 years.

The letter RLC hand-delivered to USEPA at the January 14, 2003 meeting (dated January 13, 2004) recites the permit history and attaches the pertinent language from RLC’s 1995 and 2003 Permits. We summarize the pertinent language in the five documents here for ease of reference.

1) In RLC’s 1995 Permit, the requirement is stated as follows:

“Best Available Control Technology (BACT) has been determined to be the use of *fuel blend* (coal, coke and natural gas) having a sulfur content of 2.1% sulfur on a 24-hour

basis The permittee shall *use the following equation to show compliance with the BACT limit* . “

“The permittee shall *use the following equation to show compliance with the sulfur dioxide (SO<sub>2</sub>) BACT limit.* “

2) In RLC’s 2003 Permit, the requirement is stated as follows:

“Limitations Process P36 [i.e., Kiln #2] shall operate with Best Available Control Technology (BACT). BACT is defined as combustion of a *fuel blend* with a sulfur content that may not exceed 2.1 percent sulfur on a 24-hour basis

Compliance Demonstration The permittee shall *burn a fuel blend* which consists of no fuels other than natural gas and/or a coal blend. A coal blend is defined as a mixture of coal and coke in any proportion, ranging from 0 to 100 percent of either component. *Limit the sulfur input in the fuel to less than 147 pounds sulfur per hour, averaged over a 24-hour period, using the following equation* “

3) WDNR’s December 20, 1994 letter states as follows: “The Department would like to know if EPA would have any *concerns if an equation is established in the permit to show compliance with the SO<sub>2</sub> BACT limit of 2.1% sulfur as determined on a 24-hour average*”

4) USEPA’s January 13, 1995 letter states as follows: “The Company proposes to establish Best Achievable Control Technology (BACT) to be the use of *fuel blend* (natural gas, coke, and coal) having a sulfur content of 2.1% as determined on a 24-hour average. The conditions listed in the air pollution control permit (93-RV-108) intend to show compliance with the SO<sub>2</sub> BACT limit of 2.1% sulfur as determined on a 24-hour average. . . . Based on the above permit limitations in addition to the other requirements already included in the permit, it is our position that the permit does meet the requirements of the Clean Air Act.”

USEPA’s January 13, 1995 letter responded to WDNR’s December 20, 1994 letter. WDNR’s letter requested USEPA’s concurrence with use of the “equation” established in the permit. The two letters must be read together. When they are read together, USEPA’s January 13, 1995 letter advises that USEPA accepted the equation set out in RLC’s 1995 Permit.

5) USEPA’s November 25, 2003 Notice of Violation contains the following two descriptions of RLC’s Permit requirements.

a) Par. 8 “The 1995 permit explicitly states that the 2.1% BACT limit on sulfur is to be met *under the condition that the sulfur input to Lime Kiln #2 does not exceed 147 pounds of sulfur per hour, averaged over a 24-hour period.*”

b) Par. 12. “Rockwell Lime has failed to meet the 2.1% BACT limit in its PSD permit of *147 pounds of sulfur per hour, averaged over a 24-hour period*, at Lime Kiln #2 “

**Rather than establishing two independent definitions of BACT, these provisions articulate a single definition of BACT which is to be demonstrated by use of the equation to determine whether the sulfur input of the fuel blend on an hourly basis complies with the 147 pound per hour limit, averaged over 24-hours. RLC has met this requirement consistently since it was first put into RLC's permit. There has never been a day on which this limit has been exceeded.**

The logical reading of this language is that WDNR and USEPA intended to limit the SO<sub>2</sub> emissions from RLC's Kiln 2 by establishing a limit on the sulfur *input* of the *fuel blend* to the kiln. RLC may use any of four different fuel types in varying combinations and amounts at any given time – coal, petroleum coke, petroleum coke/coal blend (the “solid fuels”), and natural gas. The equation set out in RLC's 1995 and 2003 Permits is derived from a decision to select 2.1% sulfur content coal as the base case and to create an equivalent that would represent any combination in any amount of the four fuel types in the fuel blend. The Permit equation translates that 2.1% sulfur *content* for coal into an equivalent sulfur *input* limit for any fuel blend of coal, petroleum coke, petroleum coke/coal blend and/or natural gas by establishing a consistent pounds per hour sulfur input limit for any fuel blend as the BACT limit in the permit, i.e. 147 pounds per hour sulfur input in the “fuel blend” averaged over a 24-hour period.

**In other words, given the myriad number of combinations of fuels and the amounts of each of the fuels in those combinations, the agencies wisely chose to express the BACT limit as a *single* limitation on sulfur *input* to the kiln which can be easily applied to all the approved fuel types and combinations. This is the way in which the permit language has been consistently applied since WDNR issued RLC's 1995 Permit.**

The 1995 and 2003 Permits are clear – the compliance demonstration is 147 pounds per hour sulfur input of the fuel blend averaged over a 24-hour period. RLC has been in consistent compliance with that requirement, whether it is calculated on a “wet/wet” basis or a “dry/dry” basis.

## C Next Steps

As it should be, USEPA's ultimate concern is the level of SO<sub>2</sub> emissions leaving the facility and entering the atmosphere. Rather than sulfur *content* and sulfur *input*, this approach appropriately looks at sulfur *output* to the atmosphere. With that in mind, we have also reviewed our stack test data to evaluate SO<sub>2</sub> emission levels in comparison to the 147 pounds per hour sulfur input limit discussed above.

The authorized 147 pounds per hour sulfur input limit would translate into authorized SO<sub>2</sub> emissions of approximately 294 pounds per hour. As **Attachment 5** demonstrates, our stack test data show our SO<sub>2</sub> emissions are well below that level, ranging from 128 pounds to 204 pounds per hour SO<sub>2</sub>, as compared to 294 pounds per hour SO<sub>2</sub>. If these numbers were expressed in pounds per hour sulfur, rather than SO<sub>2</sub>, the range would be from 64 pounds to 102 pounds per hour, compared to the 147 pounds per hour authorized by the Permit.

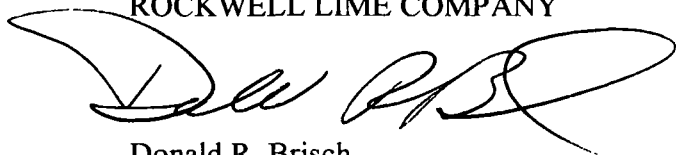


While we appreciate USEPA's suggestion that RLC consider ways in which we could revise or adjust our process to reduce SO2 emissions, all of these data demonstrate that our SO2 emissions are well below our permitted emission levels. RLC has demonstrated good engineering practice in both the design and operation of our facility.

For the foregoing reasons, we request that USEPA review these data and reconsider the position taken in your February 24, 2004 letter. We continue to believe that there has been no violation and that the Notice of Violation should properly be withdrawn. We hope this information is sufficiently clear and explanatory. We believe a meeting would be helpful to go over the information presented in this letter, so please let us know so when it can be scheduled. Thank you.

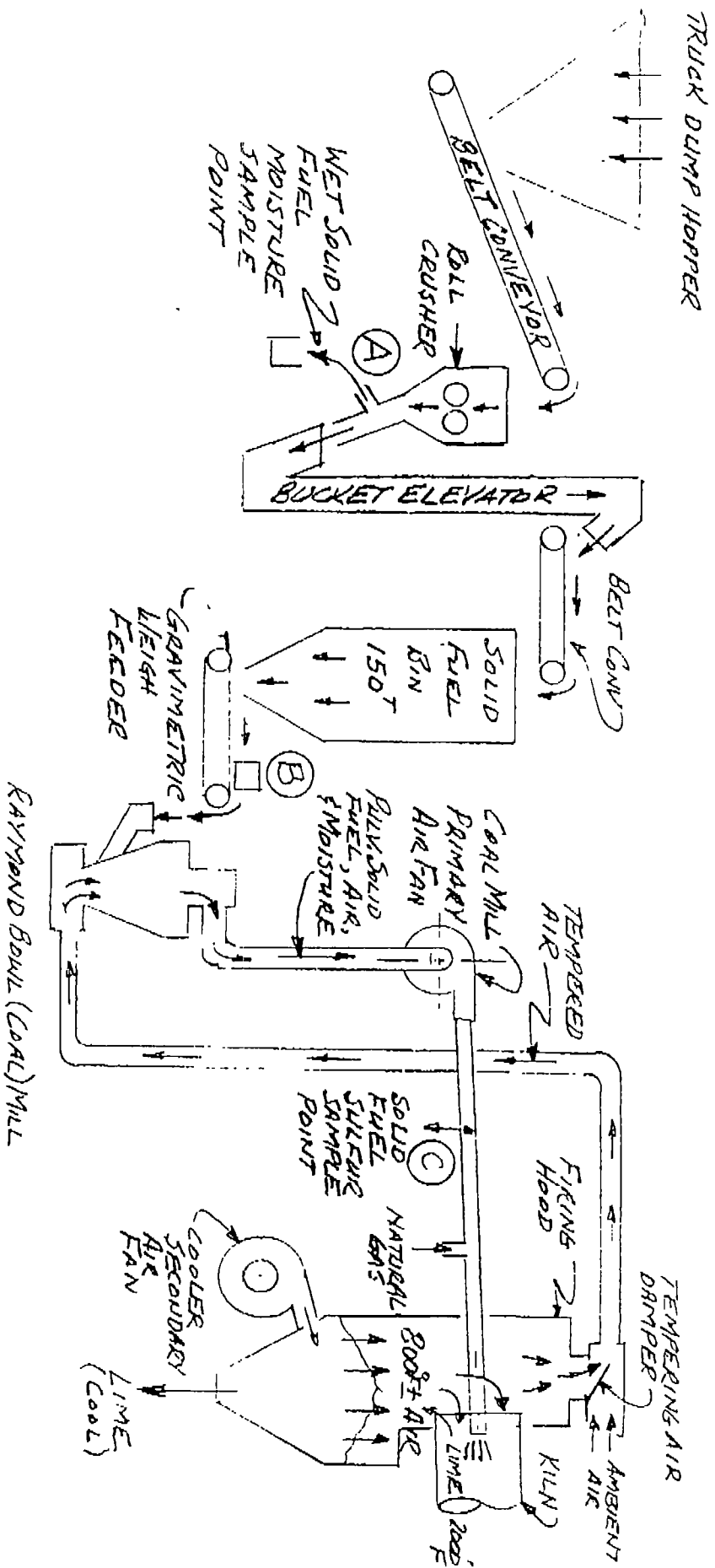
Sincerely,

ROCKWELL LIME COMPANY

A handwritten signature in black ink, appearing to read 'D. Brisch', written over the company name.

Donald R. Brisch  
President

Cc: Louise Gross, Esq., USEPA  
Constantine Loukeris, USEPA  
Terry W. Bolland  
Linda H. Bochert, Esq.



ROCKWELL LIME COMPANY  
SOLID FUEL & NATURAL GAS FIRING SYSTEM  
ATTACHMENT #1

REV 1 MARCH 31, 2004

## ATTACHMENT #2

**SGS**

February 9, 2004

ROCKWELL LIME COMPANY  
4110 Rockwood Road  
Manitowoc, WI 54220  
Attn: Carie Boldt

ADDRESS ALL CORRESPONDENCE TO:  
COMMERCIAL TESTING & ENGINEERING CO.  
18130 VAN DRUNEN ROAD  
SOUTH HOLLAND, IL 60473  
TEL (708) 331-2900  
FAX (708) 333-3660

Sample identification by  
Rockwell Lime Company

Kind of sample  
reported to us Coal/Petroleum Coke Blend

Sample ID: RLC - Test

Sample taken at Burner Pipe

Sample taken by Automatic Sampler

Date sampled January 28, 2004

Date received February 2, 2004

P.O. No. VERBAL

Analysis Report No. 71-226505

Page 1 of 1

PROXIMATE ANALYSIS

	<u>As Received</u>	<u>Dry Basis</u>
% Moisture	10.99 *	xxxxxx
% Ash	7.65	8.59
% Volatile	21.73	24.41
% Fixed Carbon	<u>59.63</u>	<u>67.00</u>
	100.00	100.00
Btu/lb	12379	13907
% Sulfur	2.13	2.39
MAF Btu		15214

ULTIMATE ANALYSIS

	<u>As Received</u>	<u>Dry Basis</u>
% Moisture *	10.99	xxxxxx
% Carbon	69.50	78.08
% Hydrogen	3.99	4.48
% Nitrogen	1.25	1.40
% Sulfur	2.13	2.39
% Ash	7.65	8.59
% Oxygen(diff)	<u>4.49</u>	<u>5.06</u>
	100.00	100.00

\* Total Moisture supplied by Rockwell Lime Company.

METHODS

Moisture: ASTM D 4931; Ash: ASTM D 4422; Volatile: ASTM D 4421; Fixed Carbon: Calculated Value; ASTM D 3172  
Btu/lb: ASTM D 5865; Sulfur: ASTM D 4239 (Method C); Carbon, Hydrogen & Nitrogen: ASTM D 5375

MEMBER  
**ACIL**

Respectfully submitted,  
COMMERCIAL TESTING & ENGINEERING CO.

*[Signature]*  
South Holland Laboratory

Commercial Testing & Engineering Co.

Minerals Services - Corporate Office

1818 S Highland Ave., Suite 2108, Lombard, IL 60148 t (630) 953-9300 f (630) 953-9306 www.cte.com

Member of the SGS Group (Société Générale de Surveillance)

## ATTACHMENT #3

### FREEMAN UNITED COAL MINING COMPANY

DIVISION OF MATERIAL SERVICE CORPORATION  
300 WEST WASHINGTON STREET • CHICAGO ILLINOIS 60608 • 312/263-2800

April 21, 1978

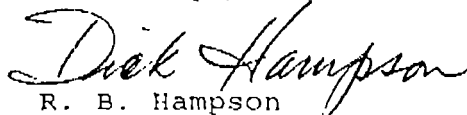
Mr. Lee Niems  
L. H. Niems and Associates Inc.  
2555 West Lincoln Highway  
Olympia Fields, Illinois 60461

Dear Mr. Niems:

Enclosed you will find a full proximate analysis as well as the ultimate which represents our Orient No. 3 Mine 1 1/2" x 0 washed screenings which we are shipping to your client, Mississippi Lime Company. We are also enclosing the average analysis for the calendar year 1977 on the product. You will note that it varies slightly, particularly in the ash and sulfur from our normal product analysis.

If you have any additional questions, please let me know.

Sincerely yours,



R. B. Hampson  
Manager Technical Services

RBH.kar  
ENCL.

cc: Messrs. W. J. Bengel w/attach  
R. W. Caputo w/attach  
G. A. Roberts w/attach  
J. L. Davis w/attach

456

FREEMAN UNITED COAL MINING COMPANY  
ORIENT NO. 3  
1½" or 1" WASHED SCREENINGS

PROXIMATE ANALYSIS:

	<u>AS REC'D</u>	<u>DRY</u>
% MOISTURE	11.00	-
ASH	8.28	9.30
VOLATILE	32.48	36.50
F. CARBON	48.24	54.20
BTU	11,660	13,101
% SULFUR	1.85	2.08
% ALKALIES AS Na <sub>2</sub> O	-	-

ULTIMATE ANALYSIS

% MOISTURE	11.00	-
CARBON	64.73	72.73
HYDROGEN	4.39	4.93
NITROGEN	1.33	1.50
CHLORINE	0.30	0.34
SULFUR	1.85	2.08
ASH	8.28	9.30
OXYGEN (By Diff.)	8.12	9.12

MINERAL ANALYSIS OF ASH:

Phos. Pentoxide	P <sub>2</sub> O <sub>5</sub>
Silica	SiO <sub>2</sub>
Ferric Oxide	Fe <sub>2</sub> O <sub>3</sub>
Alumina	Al <sub>2</sub> O <sub>3</sub>
Titania	TiO <sub>2</sub>
Lime	CaO
Magnesia	MgO
Sulfur Trioxide	SO <sub>3</sub>
Potassium Oxide	K <sub>2</sub> O
Sodium Oxide	Na <sub>2</sub> O
Undetermined	

% WEIGHT

ASH FUSION

F

I.D.	2155
Soft (H=W)	2280
Soft (H=½W)	2300
Fluid	2370

Hardgrove Grindability Index 55.

F.S.I. 4.0

# ATTACHMENT #4

## ROCKWELL LIME COMPA Analysis of the Pounds of Sulfur per Hour on a "W June 2003

x - Known data

Date	Operating Hours	Production TPD	Nat Gas % Input	Solid Fuel % Input	Solid Fuel						
					Nat Gas btu/cu ft	Type	Total Wt Wet lb	Total Wt Dry lb	Moisture % Wet fuel	Sulfur % Dry fuel	Sulfur % Wet fuel*
1-Jun-03	x	x			x	x	x		x	x	
1-Jun-03	24 00	291 08	5 52%	94 48%	1011	C/C	124,144	115,466	6 99	2 45	2 2787
2-Jun-03	24 00	284 60	5 44%	94 56%	1011	C/C	124,679	116,151	6 84	2 90	2 7016
3-Jun-03	24 00	292 42	5 40%	94 60%	1011	C/C	125,575	117,174	6 69	2 93	2 7340
4-Jun-03	24 00	292 38	5 46%	94 54%	1011	C/C	125,026	115,074	7 96	2 95	2 7152
5-Jun-03	24 00	288 40	5 34%	94 66%	1011	C/C	124,185	115,045	7 36	2 78	2.5754
6-Jun-03	24 00	288 63	5 40%	94 60%	1011	C/C	124,972	115,399	7 66	2 96	2.7333
7-Jun-03	24 00	289.76	5 44%	94 56%	1011	C/C	124,599	115,291	7 47	2 96	2 7389
8-Jun-03	24 00	290 48	5 54%	94 46%	1011	C/C	124,655	114,209	8 38	2 96	2 7120
9-Jun-03	24.00	281 02	5 68%	94 32%	1011	C/C	124,025	111,052	10 46	2 89	2.5877
10-Jun-03	24 00	270 03	5 95%	94 05%	1011	C/C	122,541	107,187	12 53	2.97	2 5979
11-Jun-03	24 00	280 58	5 85%	94 15%	1011	C/C	123,866	109,460	11 63	2 85	2 5185
12-Jun-03	24 00	282 62	5 64%	94 36%	1011	C/C	123,871	110,592	10 72	2 89	2 5802
13-Jun-03	24 00	281 82	5 46%	94 54%	1011	C/C	124,935	114,778	8 13	3 04	2 7928
14-Jun-03	24 00	280 54	5 44%	94.56%	1011	C/C	124,192	112,891	9 10	3 04	2 7634
15-Jun-03	24 00	288 18	5 56%	94 44%	1011	C/C	125,019	115,280	7 79	3 04	2 8032
16-Jun-03	24 00	279 04	5 46%	94 54%	1011	C/C	123,075	114,312	7 12	2 86	2 6564
17-Jun-03	24 00	275 92	5 38%	94 62%	1011	C/C	124,993	116,943	6 44	2 78	2 6010
18-Jun-03	24 00	283.47	5 35%	94 65%	1011	C/C	124,498	116,505	6 42	2 95	2 7606
19-Jun-03	24 00	289 36	5 50%	94 50%	1011	C/C	124,550	114,561	8 02	2 88	2 6490
20-Jun-03	24 00	286 17	5 50%	94.50%	1011	C/C	124,200	114,637	7 70	2 90	2 6721
21-Jun-03	24 00	281 92	5 40%	94 60%	1011	C/C	124,660	115,099	7 67	2 90	2 6776
22-Jun-03	24 00	284 58	5 36%	94 64%	1011	C/C	124,266	115,406	7 13	2 90	2 6932
23-Jun-03	24 00	281 40	5 27%	94 73%	1011	C/C	122,519	117,226	4 32	2 91	2 7843
24-Jun-03	24 00	283 75	5 09%	94 91%	1011	C/C	123,748	121,892	1 50	2 71	2 6694
25-Jun-03	24 00	288 19	5 12%	94 88%	1011	C/C	124,259	117,524	5 42	2 70	2 5537
26-Jun-03	24 00	290 59	5 40%	94 60%	1011	C/C	124,721	113,085	9 33	2 95	2 6748
27-Jun-03	24 00	283 08	5 37%	94 63%	1011	C/C	123,967	114,000	8 04	2 57	2 3634
28-Jun-03	24 00	286 48	5 49%	94 51%	1011	C/C	123,370	113,081	8 34	2 57	2 3557
29-Jun-03	24 00	283 87	5 41%	94 59%	1011	C/C	123,879	113,052	8 74	2 57	2 3454
30-Jun-03	24 00	273 97	5 34%	94 66%	1011	C/C	124,150	112,989	8 99	2 72	2 4755

\* Minor differences in the Avg. Lbs Wet Sulfur/Hr between this spreadsheet and the June 20 January 13, 2004 letter is due to rounding.

# ATTACHMENT #5

## ROCKWELL LIME COMPANY SO<sub>2</sub> Stack Test Results

Date	Testing Firm	Actual SO <sub>2</sub> Lbs/Hr	Permit Limit SO <sub>2</sub> Lbs/Hr	% Permit Limit	Potential SO <sub>2</sub> Lbs/Hr*	% Capture Eff. (Potential)
10/15/1992	ETE Corp.	145.97	294	49.65%	228.67	36.17%
11/20/1996	EMT. Corp.	0.02	294	0.01%	272.93	99.99%
11/24/1998	EMT. Corp.	146.03	294	49.67%	199.00	26.62%
12/21/2000	CAE	128.00	294	43.54%	176.23	27.37%
11/14/2002	CAE	204.10	294	69.42%	227.67	10.35%

\* - Calculated average of the (3) - 1 hour test periods